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CRITICISMS AND DISCUSSIONS.

CURRENT PERIODICALS.

The number of the *Revue de métaphysique et de morale* for January, 1916, is wholly devoted to the commemoration of Malebranche, whose death took place on October 13, 1715. Maurice Blondel writes on the anti-Cartesianism of Malebranche, Emile Boutroux on the intellectualism of Malebranche, Pierre Duhem on the optical work of Malebranche, R. Thamin on Malebranche's *Traité de morale*, E. van Biéma on how Malebranche conceived psychology, and Victor Delbos on Malebranche and Maine de Biran; while Desiré Roustan puts in a plea for an edition of the collected works of Malebranche.

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Among the especially noteworthy articles in the *Bulletin of the American Mathematical Society* for 1916 are reviews which are wonderful examples of research, by Prof. R. C. Archibald of books on the life and work of Napier, and of mathematical quotations (January number), and of Goldenring's history of the construction of a regular polygon of seventeen sides (February number); Dr. R. L. Moore's article on a non-metrical pseudo-Archimedean axiom (February number); and Prof. E. J. Wilczynski's address on the historical development and the future prospects of the differential geometry of plane curves, in which a precise and profound delimitation of the subject-matter of differential geometry is given.

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There are three papers of particular interest to the readers of *The Monist* in the number of the *Transactions of the American Mathematical Society* for January, 1916: Prof. W. F. Osgood sets at rest some interesting questions in the theory of analytic functions of several complex variables by means of simple examples;

Profs. E. B. Van Vleck and F. H. Doubler study Theta functions as defined by functional equations; and Dr. B. A. Bernstein, starting from *class* and *operation* as primitive ideas, succeeds in reducing to four the number of postulates necessary for Boole's algebra of logic.

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In the number of *Scientia* for February 1916, the Abbé Th. Moreux discusses the problem of the novae—stars which appear suddenly at certain periods in the heavens—and the constitution of the universe. Fillippo Bottazzi gives the second part of his article on the fundamental physiological activities; this part is on muscular activity. Annie S. D. Maunder (Mrs. Walter Maunder) deduces some interesting things about prehistoric Iranian migrations from passages in sacred books of Persia—the *Vendidad* and the *Tir Yasht*. Charles Gide writes on the expenditures of the belligerent nations and their economic consequences; and Achille Loria writes on the probable social and economic consequences of the war. Besides this there are reviews of books and periodicals, and French translations of articles in Italian and English.

In *Scientia* for March, 1916, C. G. Abbot writes on the sun as regards its composition and state as transmitter and receiver of energy. E. Bouthy gives the first part of an article on the kinetic theory of gases. This part is devoted to the foundations, and it is interesting to notice that the author says that in a kinetic and therefore mechanistic theory we must consider, besides visible motions, *hypothetical and invisible motions*. Louis Matruchot writes on the light thrown on the problem of cancer by vegetable pathology, cancers having been discovered in vegetables. Otto Jespersen of Copenhagen gives some reflections of a Dane on the war; and Camillo Supino of Pavia writes on the economic sources of the war. The number is completed by book reviews and a review of periodicals.

In *Scientia* for April, 1916, Aldo Mieli writes on the pneumatic period of chemistry: the study of gases from the time of Robert Boyle to that of Lavoisier. E. Bouthy gives an account of the development and difficulties of the kinetic theory of gases; the question of thermal radiation will be treated in another article as this subject is a great difficulty in the way of the kinetic theory. Etienne Rabaut writes on embryonic phenomena and phylogenesis. J. Holland Rose of Cambridge, England, discusses the future of

Europe; and C. A. Reuterskiöld of Upsala in Sweden indicates what he thinks should be the chief lines of international law after the war. There is a general review of the problems of the fable with special reference to Hindu literature, by A. M. Pizzagalli. There are also reviews of books and periodicals.

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The number of *Scientia* for June 1916 opens with a suggestive article by Professor Pincherle on "Intuition and the Calculus of Probabilities." The word "probability" or "chance" is meaningless to the man from whom no causes are hidden. The definition of "probability" implies the principle of equivalence of causes, and this symmetrical principle implies the absence of any cause which is even in the smallest degree a dominating cause. The simpler cases with which the calculus of probability deals are those in which the number of possible causes is finite. Things become more complicated when that number is no longer finite, or when the possible causes form a continuum, for the elementary definition of probability must now be generalized. The author proceeds to show that there is more than a simple agreement between the data of intuition and the theoretical results of the calculus of probabilities. By the elaboration of a few principles of extreme simplicity, the calculus substitutes, as it were, for these data, propositions frankly deductive in their character. Thus intuition comes into play—first in the preliminary exploration of a question, secondly, in helping us to foresee results, and finally, in detecting from this or that result the weak spot at which the assault of scientific criticism may be most effective. Prof. W. M. Bayliss deals with "Surface Phenomena in Living Structures." He is inclined to think that it may be safely said that the peculiarities of the so-called "vital" phenomena are due to the fact that they constitute manifestations of exchange of energy between the phases of a heterogeneous system. Special degrees of activity may be detected during the transformation of energy, e. g., electric phenomena during the oxidation of phosphorus or benzaldehyde. Life is an incessant change, or a continuous transfer of energy, and a system in a state of statical equilibrium is equivalent to death. In "After the War," Ettore Ciccotti foresees that the causes of conflict between nations are too deeply rooted to be eliminated by this war, whatever may be its result. The hegemony of the money market will be transferred from the Old World to the New. The experiences of the last two years

will force every nation to undertake an exhaustive examination of its natural resources, and all energies will be devoted to the development of productive forces, and to organization for the purpose of unifying, multiplying, and rendering immediately available the energies of the state. Social justice, emancipation from class domination, and the recognition of peace as the universal goal of humanity will be the chief articles in the creed of the new international socialist party. And finally we may see, for the next generation or so, a humanity penetrated by the most poignant of pessimisms.

The July number opens with a paper by Antonio Favaro on the "Effect of the Condemnation of Galileo upon the Progress of Science." One of the most serious consequences was the difficulty found by men like Descartes in the full expression of their thought. Rome was powerless to check the innermost thoughts of men, but she could and did use her powers of intimidation to such effect that what should have been the philosophy of the age was either directly checked, made but a timid advance, or was diverted from its natural channels. All that was new or out of the common rut came under suspicion. All the protestations and submissions of Descartes could not prevent his works being placed on the Index. At the nod of a Richelieu the Sorbonne returned to a sun revolving round the earth.—The study of the phenomena of cathodic bombardments, set forth in his article "The Colloids and Projections from Cathodes," has led Professor Houllevigue to the conclusion that the projectiles launched by an electrode of silver are of the same order of magnitude as the granules of colloidal silver deposited in the Bredig process. Experiments carried on for several years have brought him to the belief that it will clarify our ideas if we cease for the moment the study of colloids from the point of view of a solid or liquid state, and consider what takes place in the gaseous colloidal medium which surrounds the cathode in activity in a vacuum tube. This view he throws out with some reserve; but, as he reminds us, even if an hypothesis proves to be unfounded, it may still play its part in the progress of science by the experiments to which it leads.—Professor Lalande contributes a subtly conceived little paper on the "Relations between Logic and Psychology." The progress of logical intelligibility is marked by the discovery of resemblances in given differences. The ideal of scientific success is the absorption of facts *sui generis* in a wider formula common to

them all. We may not reach the why and the wherefore of the world by means of the logical norm, but the rich diversity of the universe provides for that norm, as it were, the fuel for the fire.—The "Reparation of the Waste of War," and the "Principal Economic Consequences of the Interruption of International Exchanges" form the texts for two articles by Mr. W. R. Scott and F. Virgilii respectively. Dr. Jankelevitch reviews the series of articles that have appeared in *Nature* and *Science Progress* dealing with the organization of science, its relations to the state, and the proper payment of scientific men.

In the August *Scientia* J. L. Heiberg discusses the role of Archimedes in the development of the exact sciences. The author describes the probable equipment with which Archimedes began his mathematical labors. His mastery of the weapons of his age in the attack on the theory of the conic sections, and their application to the solution of problems of a higher order, was considerable enough to win for Apollonius in later days the title of "plagiarist." The spiral of Archimedes was a magnificent geometrical effort which was later utilized in important investigations on the surface of the cylinder and sphere. The *Arenarius* reminds us of his success in dealing with large numbers. The influence of the great Greek upon succeeding ages is then carefully traced. The treatise on mechanical method, discovered but a decade ago,¹ would have greatly simplified the work of Kepler and Cavalieri had it been in their hands.—The "Hydrology of the Carso" of Istria, Carniola and Trieste, forms the subject of a most interesting geological paper by Prof. Luigi De Marchi.—A paper by Prof. L. Vialleton on the biogenetic law is based upon the precocity of the appearance of different types of the same group in the paleontological development. There is an undoubted parallelism between paleontological and ontogenetic development. Both issue at an early stage in well-defined and often divergent forms between which are no intermediaries. The anterior limb of the lemur could never be transformed into the wing of the bat, because its construction enables it to act in a vertical or nearly vertical plane, and never in the horizontal plane as in the case of the wing. There is little doubt that Cuvier's correlation law will play an important part in the explanation of the morphological puzzles that have yet to be unravelled.—Messrs. J. B.

¹ *Geometrical Solutions Derived from Mechanics*. Discovered and translated by Professor Heiberg. English edition published by Open Court Publishing Company, 1909.

Clark and E. Catellani treat respectively of the economic dynamics of war and the conditions under which peace may be secured and further outbreaks of war prevented.

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The number of *Science Progress* for April, 1916, contains papers by James Johnstone on the mathematical theory of organic variability, by David Fraser Harris on the specific characteristics of vitality, by C. Mansell Moullin on the natural history of tumors, and by Joseph Offord on the knowledge of the ancients regarding the propagation of disease by flies and rodents; and the third part of the investigations by Sir Ronald Ross on the solution of equations by operative division. Besides this there are very many reviews of books, notes, correspondence, and the usual long quarterly reports on the recent advances made in the various branches of science.

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With the July number of *Science Progress* a new volume begins—the eleventh—and an extension of purview is shown by the addition of “and Affairs” to the old title, “A Quarterly Review of Scientific Thought and Work.” Articles no longer are awarded the bulk of the space at the disposal of the Editor. Just over three quarters of the number are given to notes, essays, reviews and to the very valuable pages entitled “Recent Advances in Science,” now running to 50 pages or so. Mr. Bradford’s “Historical Sketch of the Chemistry of Rubber” closes with an expression of confidence that before very long we shall have a synthetic rubber on the market. Mr. Friend deals with the “Bionomics of English Oligochaeta,” Part ii—a most useful piece of (unpaid) work, in which stress is laid on the benignant role of Pachydrilids in the economy of nature. “A Biologist” in “The Pollution of the Sea” has an opportunity, of which he cordially avails himself, of exposing the mischiefs inherent in lawyer-made law upon matters dealing with the realities of life. And Mr. Reid Moir is at home in “Flint Fracture and Flint Implements,” giving an account of experiments devised to distinguish between human and natural flaking. Among the essay-reviews is a long and interesting account of a great medical reformer—John Shaw Billings, “a man who was unique in the history of his profession.”

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